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AMERICAN WOODS

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TUPELO

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The name "tupelo" includes four species belonging to the genus Nyssa--water tupelo (commonly known as tupelo gum, tupelo, or simply gum), black tupelo (commonly called black gum), swamp tupelo (generally called swamp black gum), and ogeche tupelo. Water tupelo and black tupelo are by far the most abundant and important of the tupelos and the largest. Swamp tupelo ranks next. Ogeche tupelo is of little importance commercially.

All of the four tupelos except black tupelo are water-loving trees and grow principally in the fresh water swamps and along the edges of streams and ponds in southeastern United States where they are the chief associates of baldcypress and, like baldcypress, often develop a swelled base. This enlarged base and especially the spreading root system of these trees gives greater stability in loose soil. Black tupelo has a much wider range of growth than the other tupelos and is found throughout the entire eastern United States. In the South it is generally restricted to relatively well drained sites. Further north it occurs in wet locations as well as on high, dry ground.

The wood of the tupelos is alike in appearance and it is difficult to identify the different species with certainty even with the aid of a microscope capable of high magnifications. No attempt to separate the four species is made by commercial lumber inspectors. If the locality of growth is known this may enable black tupelo to be separated from the others as it grows in extensive areas where they do not occur. The fibers of the tupelos are interwoven, and the wood is tough and difficult to split. The lumber requires care in seasoning in order to overcome a tendency to bow and twist. Tupelo lumber is used principally for shipping containers and furniture. The wood is also used for veneer and paper pulp. It is only in recent years that tupelo

has gradually come to be marketed under its own name although other names, such as "bay poplar", presumably coined to indicate similarity to an established species, still persist. Formerly when the tupelos were encountered in baldcypress logging operations, they were left as worthless. The passing of the prejudice against these woods is due to a better understanding of their characteristics and fields of usefulness.

NOMENCLATURE.--Following are the common and botanical names of the four species of tupelo, together with a number of other names in use:

Common Name	Botanical Name	Other Names
Water tupelo	Nyssa aquatica	Tupelo gum Tupelo Gum Swamp Tupelo Cotton gum Sour gum Swamp gum Bay poplar Swamp poplar Hazel pine
Black tupelo	Nyssa sylvatica	Black gum Sour gum Pepperidge Tupelo Gum Tupelo gum
Swamp tupelo	Nyssa biflora	Swamp black gum Black gum Tupelo gum Sour gum Water gum
Ogeche tupelo	Nyssa ogeche	Sour tupelo Gopher plum Tupelo Wild limetree Ogeche plum

DISTRIBUTION AND GROWTH.--Water tupelo grows in a belt about 100 miles wide along the Atlantic Coast from Virginia to northern Florida. From northern Florida its range extends westward through the Gulf States to southern Texas and northward up the Mississippi River valley to southern Illinois (see map). Water tupelo grows in locations subject to standing water, often in deep swamps which are inundated during a considerable portion of the year. In such locations it is next in importance to baldcyress, which is the dominant species. When the swamps are logged, principally for baldcypress, a considerable number of the water tupelo trees are left. These act as seed trees, and in many cases the cut-over areas are growing up largely in water tupelo with comparatively little cypress. Under favorable conditions water tupelo requires about 25 years to reach a diameter of 6 inches and a height of 40 feet, and about 50 years to reach a diameter of 10 inches and a height of 70 feet. The largest trees are about 100 feet in height and from 3 to 4 feet in diameter above the swelled base.

Black tupelo grows in all the States east of the Mississippi River, and, in the southern part of its range, as far west as central Texas (see map). In the northern and eastern parts of its range it grows under a wide variety of conditions ranging from swamps to dry mountain sides. In the South it is largely confined to well drained locations. Black tupelo is generally a smaller tree than water tupelo. The largest specimens, however, reach a height of 120 feet and a diameter of 5 feet, exceeding the largest trees of water tupelo. If scorched by forest fires, black tupelo is quite subject to butt rot. The leaves turn red in the early fall, and the tree rivals the red maple in the richness of its autumn coloring.

Swamp tupelo has approximately the same range as water tupelo except in the Mississippi River valley where it rarely occurs north of Baton Rouge, Louisiana, and is very scarce west of the Mississippi River. It grows in the shallower swamps and ponds but is not such a water-loving tree as water tupelo.

SUPPLY: -- A forest survey recently completed in the Southeast(1) shows a combined stand of water tupelo and black tupelo of 14,216,700,000 board feet(2) distributed as follows:

	Board Feet
Alabama	1,428,000,000
Arkansas (3/4 area of State)	962,400,000
Florida	1,590,100,000
Georgia	2,524,400,000
Louisiana	3,829,300,000
Mississippi	1,919,300,000
Oklahoma (southeastern corner)	48,700,000
South Carolina (southern portion of State)	993,700,000
Texas (extreme east)	920,800,000
Total	14,216,700,000

The stand of black tupelo in the Southeastern States as a whole is markedly greater than that of the other tupelos. In the Delta region of Louisiana, however, where the great bulk of the water tupelo timber is located, there is comparatively little black tupelo.

The total combined stand of water tupelo and black tupelo, including an allowance for the stand of these species outside of the area in which the Forest Survey has been completed and also an allowance for the other two tupelos, is estimated at 15,000,000,000 board feet.

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(1) Conducted by the Southern Forest Experiment Station of the Forest Service, U. S. Department of Agriculture, as part of a Forest Survey of the United States and by far the most accurate survey of its kind ever made.

(2) Based on the International 1/4-inch log rule

PRODUCTION:

Lumber: -- The production of tupelo lumber was first recorded separately in 1905(3). The amount was 35,794,000 board feet. This includes water tupelo and black tupelo and probably a small amount of swamp tupelo. It is believed that over one-half of the recorded cut of tupelo is black tupelo. From 1905 to 1917 the production of tupelo lumber increased quite uniformly to 250,000,000 board feet (see chart). After that it decreased, dropping to 134,000,000 feet in 1921 and then rising to 317,000,000 feet in 1928. In 1932, a year of business depression, it fell as low as 88,000,000 feet. In 1937 it recovered to the maximum cut so far attained--326,927,000 board feet--produced by 21 States. The average annual production of tupelo lumber for the 10-year period 1931-1940 was approximately 192,000,000 board feet. Louisiana has been the leading State in production since 1907. During the 10-year period 1931-1940 over one-fourth of the tupelo lumber came from that State. The States occupying second and third places as producers of tupelo lumber have generally been South Carolina, North Carolina, and Alabama.

Veneer: -- In 1905, the earliest year for which statistics on the amount of tupelo used for veneer are available, consumption amounted to 314,000 feet log scale. The use of tupelo for veneer increased rapidly and in 1927 reached 113,729,000 feet. Consumption dropped to about one-half of this amount in 1931, a year of business depression, but by 1937 it had recovered to approximately 170,000,000 feet--the largest annual consumption so far reached. In 1939(4) consumption was 156,426,000 feet. The average amount of tupelo used annually for veneer purposes in recent years has been about 100,000,000 feet log scale, equivalent to approximately 115,000,000 board feet of lumber(5).

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(3) Lumber production statistics of the Bureau of the Census.

(4) The latest year for which statistics are available.

(5) In converting feet log scale to board feet, the overrun has been taken as 15 percent.

Pulpwood: -- The consumption of "gum"(6) in the manufacture of paper pulp was first listed separately in 1916. The amount was 27,391 cords. Gum pulpwood consumption has varied considerably from year to year. The maximum (72,611 cords) occurred in 1928 and the minimum (17,553 cords) in 1932(7). Consumption in 1936 was practically the same as in 1916. The average annual consumption of gum pulpwood in recent years(8) has been about 35,000 cords, equivalent to approximately 10,000,000 board feet.

In addition to the tupelo cut for lumber, veneer, and paper pulp, unknown amounts are cut for railway ties, cooperage, and local uses. The total annual consumption of tupelo in recent years is estimated at approximately 350,000,000 board feet.

PROPERTIES:--The wood of water tupelo and black tupelo is quite similar in appearance and properties. The heartwood is light brownish grey and merges gradually into the lighter colored sapwood which is generally several inches wide. The annual rings are indistinct. The wood has a close, uniform texture and a very interlocked grain which prevents splintering under heavy wear and makes the wood difficult to split. It is rated as moderately heavy(9), moderately strong when used as a beam or post, hard, moderately stiff, and moderately high in ability to resist shock. The wood has a tendency to warp and twist due to the interlocked grain and requires considerable care in drying to produce straight, flat lumber. Quarter-sawed lumber is easier to dry without warping than plain sawed lumber(10), and a con-

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(6) Under "gum" as used in the statistics of the Bureau of the Census is included water tupelo, black tupelo, and probably small amounts of swamp tupelo, and also of sweetgum (LIQUIDAMBAR STYRACIFLUA) which belongs to an entirely different genus and family from the tupelos.

(7) A year of business depression.

(8) In 1933, 1934, 1939 and 1940 gum pulpwood was not listed separately.

(9) The average weight of both water tupelo and black tupelo when air dry (12 percent moisture) is 35 pounds per cubic foot.

(10) In quarter-sawed or edge-grain lumber the annual rings form an angle of 45° or more with the wider surfaces of the boards. Other lumber is classed as plain sawed or flat grain.

siderable proportion of both species (probably 50 percent) is quarter-sawed. Both the quartered and plain lumber can be seasoned satisfactorily if proper methods are used. The shrinkage is moderately large. Tupelo generally requires special treatment before gluing to obtain the best results. The gluing properties, however, vary considerably with different glues. The wood has the reputation of holding paint well(11). Occasional trees of tupelo which have grown in very wet locations produce exceptionally light-weight wood in the swelled butts. Both water tupelo and black tupelo lack durability when placed under conditions favorable to decay. Both, however, are classed among the woods whose heartwood is easily penetrated by preservatives(12).

The relative machining properties of water tupelo and black tupelo are given in the following tabulation which also includes sweetgum and the average of 25 species of southern hardwoods for purposes of comparison:

Percentage of Pieces in Good Condition after Being Subjected to the Following Machining Operations.

	Planing	Shaping	Turning	Boring	Mortising	Steam bending	Sanding
Water tupelo	..	43	79	62	35	46	34
Black tupelo	48	23	75	82	24	42	21
Sweetgum	51	21	86	92	58	67	23
Average of 25 species	61	25	79	89	70	62	45

The figures show the percentage of the pieces tested in each machining operation that were in good to excellent condition after being subjected to the operation indicated. Water tupelo ranked above black tupelo in all but one operation (boring), and both were below sweetgum except in shaping and

(11) Definite data on this point are not available.

(12) The sapwood of all species is generally easy to penetrate with a preservative. Exceptions include the sapwood of eastern hemlock, the true firs, and the spruces.

sanding. Water tupelo showed up well in the shaping tests, but both the tupelos were decidedly below average in mortising due probably to their interlocked grain which has a tendency to cause chipped or rough surfaces. They were also considerably below the average in steam bending. In nail-holding ability and in resistance to splitting under the action of nails the tupelos have an intermediate rank.

Both black tupelo and water tupelo can be reduced to paper pulp by the soda process(13) although not as readily as a number of other hardwoods such as aspen, soft maple, and elm. The resultant pulp is somewhat stronger than that made from aspen--a wood long used in paper manufacture--but is rather difficult to bleach. It is suitable, when mixed with longer fibered pulps made from other species, for the manufacture of book and similar grades of paper. The semichemical process(14) also gives satisfactory results with tupelo. With unselected wood a fairly dark colored pulp is produced suitable for low grade print paper and boards, but with pulpwood cut from young trees with little dark colored heartwood a comparatively light colored pulp results, which, when mixed with groundwood pulp from southern yellow pine, yields a pulp with definite possibilities as a source of newsprint. The sulphite process is also applicable to young tupelo with little dark colored heartwood and produces a fairly strong pulp of excellent blue-white color which is particularly suitable for mixing with longer fibered, stronger pulps(15) in the production of high grade papers.

PRINCIPAL USES:--Tupelo is used principally for lumber, veneer, and paper pulp, and to some extent for railway ties and cooperage. The lumber goes largely into shipping containers (boxes, crates, baskets) and furniture. Over one-half of the tupelo used for containers is black tupelo and about nine-tenths

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(13) Wood is made into paper pulp by the mechanical or groundwood process and by four chemical processes--the sulphite process, the soda process, the sulphate process, and the semichemical process

(14) Developed at the Forest Products Laboratory of the U. S. Forest Service and used commercially for the production of corrugating board for some 15 years.

(15) Especially pulp made from spruce by the sulphite process

of the tupelo used for furniture is water tupelo. Much smaller amounts of tupelo lumber are used for dairy, poultry, etc. supplies; woodenware and novelties; caskets and burial boxes; car construction and repair; and cigar and tobacco boxes. In the manufacture of cigar boxes a thin veneer of Spanish cedar(16) is frequently used over a tupelo core. Sometimes the graining of Spanish cedar is realistically reproduced directly on the tupelo without any Spanish cedar at all being used in the boxes. Tupelo has recently been supplanting cottonwood for egg cases--a large item. The ability of tupelo to show lettering to good advantage has brought about its wide use in boxes for export shipment. The wood has proved satisfactory for factory floors and platforms subjected to heavy wear. The exceptionally lightweight wood, commonly found in the swollen butts of trees grown in wet locations, is used as floats for fish nets. Tupelo veneer goes largely into boxes for berries and other fruits.

Both water tupelo and black tupelo have been used for many years in the manufacture of book and similar grades of paper. They are commonly reduced to paper pulp by the soda process and to a much more limited extent by the sulphite process. More recently the tupelos have been pulped by the semichemical process and used in the manufacture of the lower grades of print paper. Tupelo pulps are used largely as fillers in mixture with pulps from other species.

The following tabulation shows the amounts of tupelo used in the manufacture of various wooden products in 1912, 1928, 1933 and 1940. The quantities given include tupelo in the form of lumber, veneer, bolts and logs.

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(16) Spanish cedar has long been the preferred wood for cigar boxes due to the flavor and aroma it imparts to tobacco. The high price of Spanish cedar has caused the partial substitution of other woods.

TUPELO USED IN THE MANUFACTURE OF WOODEN PRODUCTS

Classes of products	Quantity - thousands of board feet			
	1912	1928	1933	1940
Agricultural implements	1,140	4	..	5
Boxes, baskets and crating	74,983	120,558	42,726	137,492
Boxes, cigar and tobacco	10,376	16,532	3,718	803
Car construction and repair	114	3	7	969
Caskets and burial boxes	500	75	55	1,115
Conduits, pumps, wood pipe	1,579(a)	..	..	..
Dairy, poultry, etc., supplies	(2)	25	2,104	3,707
Dowels and skewers	..	..	..	5
Fixtures	248	357	330	37
Flooring	(3)	(3)	(3)	544
Furniture	2,720	55,946	41,395	131,152
Handles	1	212	493	5
Instruments, musical	460	..	..	171
Instruments, scientific	12	1	10	..
Laundry appliances	3,842	905	..	562
Machinery	4,272	265	..	266
Patterns and flasks	1	..	..	..
Playground equipment	1	..	13	..
Plumbers woodwork	..	787	..	..
Printing material	10	..	..	2
Radio and phonograph cabinets	(4)	(4)	27	18
Refrigerators	39(5)	4,475(5)	..	..
Rollers, shade and map	1,006	328	..	..
Sash, doors, general millwork	17,243	30,553	93	655
Sewing machines	2,200	810	..	..
Ship and boat building	138	..	..	..
Shuttles, spools, bobbins, looms	250(6)	(6)	(6)	143
Signs, scenery, displays	..	..	..	109
Sporting and athletic goods	20	25	..	..
Tanks	20	..	..	..

(Continued on next page.

TUPELO USED IN THE MANUFACTURE OF WOODEN PRODUCTS - CONTINUED

Classes of products	Quantity - thousands of board feet			
	1912	1928	1933	1940
Toys	5	30	5	253
Trunks and valises	..	161	1	..
Vehicles, motor	(7)	15,058	1,294	366
Vehicles, non-motor	1,068	440	108	333
Woodenware and novelties	5,710(8)	8,173	529	3,072
Total	127,958	255,723	92,908	281,784(9)

Footnotes:

(1) Includes paving material.

(2) Included in woodenware and novelties.

(3) Included in sash, doors, general millwork.

(4) Included in furniture.

(5) Includes kitchen cabinets.

(6) Does not include looms.

(7) Included in vehicles, non-motor.

(8) Includes dairy, poultry, etc., supplies.

(9) This total is made up of 178,497,000 board feet of water tupelo and 103,287,000 board feet of black tupelo. The black tupelo includes 68,937,000 board feet of lumber, 17,223,000 board feet of logs and bolts, and 17,127,000 board feet in the form of veneer. The water tupelo includes 152,221,000 board feet of lumber, 11,966,000 board feet of logs and bolts, and 14,310,000 board feet in the form of veneer.

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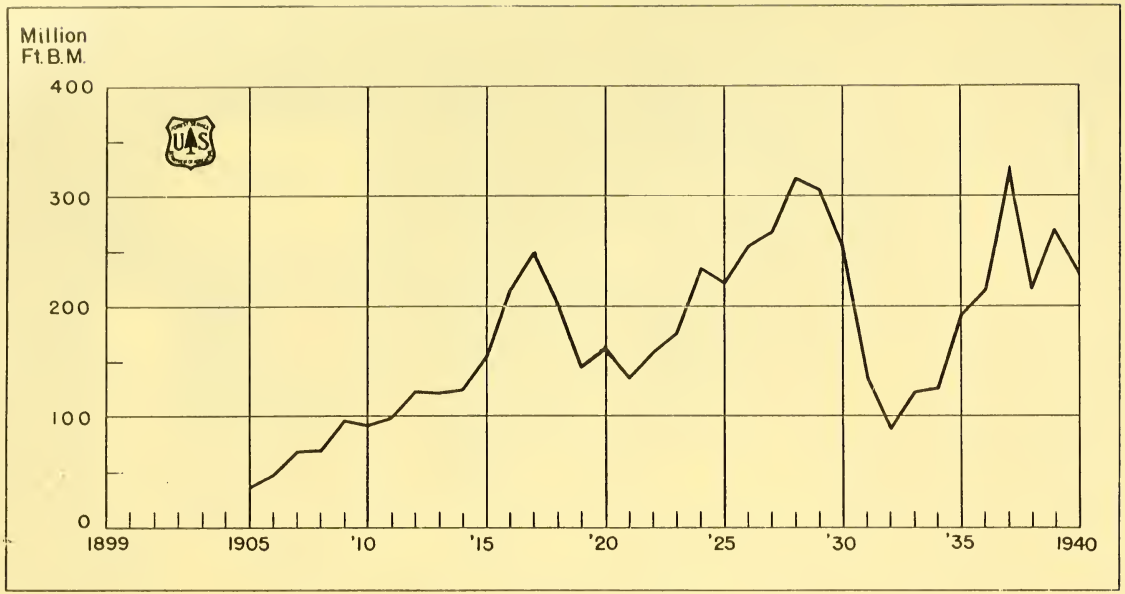
WATER TUPELO (Nyssa aquatica) BOTANICAL RANGE

BLACK TUPELO (Nyssa sylvatica) BOTANICAL RANGE



LUMBER PRODUCTION
TUPELO (Nyssa species)
1905–1940